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Lessons learned from the pilot phase of the Digital Twin Component for Glaciers project (DTC Glaciers)

Fabien Maussion¹, Julia Bizon², Nicolas Gampierakis¹, Noel Gourmelen³, Livia Jakob², Carolyn Michael², Thomas Nagler⁴, Samuel Nussbaumer⁵, Patrick Schmitt⁶, Gabriele Schwaizer⁴, and Michael Zemp⁵

¹University of Bristol, School of Geographical Sciences, Bristol, UK (fabien.maussion@bristol.ac.uk)

²Earthwave Ltd, UK

³University of Edinburgh, UK

⁴ENVEO Environmental Earth Observation Information Technology GmbH, Austria

⁵University of Zurich, Department of Geography, Zurich, Switzerland

⁶University of Innsbruck, Department of Atmospheric and Cryospheric Sciences, Innsbruck, Austria

Mountain glaciers are critical elements of the Earth's hydrological and climate systems. The rapid changes in glaciers due to climate change hinder our ability to monitor and address associated risks effectively. To address these challenges, we present the Digital Twin Component for Glaciers (DTC Glaciers), part of ESA's Digital Twin Earth (DTE) programme. In this presentation, we will demonstrate the early prototype of the DTC Glaciers system, developed through close co-design with our stakeholders in the hydropower and water sectors. The demonstration will highlight current capabilities, including regional glacier mass-balance assessment, runoff estimation, and user-informed scenarios. We will also share key lessons learned from Phase 1, focussing on data assimilation of heterogeneous datasets, the practicalities of building adaptive architectures, and the challenges of meeting diverse user needs within a unified framework. Despite these challenges, DTC Glaciers offers a well defined test case to assess the transformative potential of digital twins in climate risk assessments.